

# NASA SBIR/STTR Technologies

## H3.01-8848 - An Airborne Particulate Monitor for Spacecraft



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### Identification and Significance of Innovation

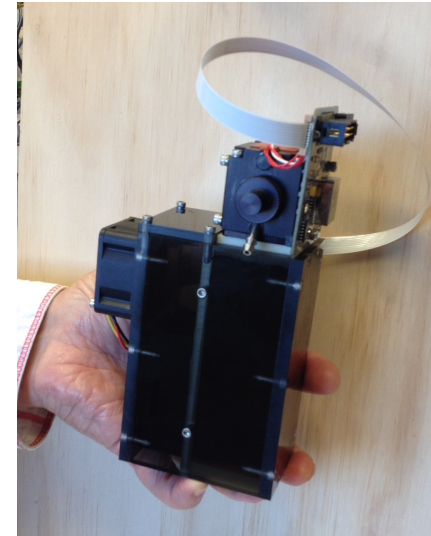
Knowledge of the concentration and size of airborne particles on manned spacecraft is needed both to assess environment to which astronauts are exposed, and to provide early warning of on-board fire. Especially important are those in the submicrometer size range. Yet to date there is no zero-gravity technique for long-term monitoring these fine particles at the low concentrations generally present. Our innovation, a tippable, self-sustaining, water-based condensation particle counter, provides a method to provide this measurement for particles as small as 10nm. Combined with ultrafine particle pre-cut, and standard optical particle counting and sizing for larger particles, this instrument system will provide particle number concentration and approximate sizing from 10 nm to above 20nm.

Estimated TRL at beginning and end of contract: ( Begin: 4 End: 6 )

### Technical Objectives and Work Plan

Project objectives are:

- 1) To construct and validate a dual channel, tippable, water based condensation particle counter that detects particles as small as 10 nm and is capable of long term operation in microgravity;
- 2) To provide approximate particle sizing through an ultrafine particle pre-cut system for one channel of the dual channel particle counter;
- 3) To extend sizing and counting to larger particles through a incorporation of a commercial, portable optical particle counter and a properly design
- 4) To integrate these components into a single system, with common microprocessor control, in a hand-carryable instrument measuring less than 4x8x8 inches.
- 5) To validate the performance through comparison with benchtop systems.



### NASA Applications

NASA will use this instrument to monitor airborne particle environment in manned spacecraft such as the International Space Shuttle. Such data are needed (1) to establish the levels and sources of airborne particulate to which crew are exposed, and (2) to provide a signature of background levels to enable earlier detection of smoke particles from fires.

### Non-NASA Applications

This instrument would be uniquely suitable for measuring concentrations on moving platforms, inside aircraft, on school buses, or in indoor environments such as offices and schools. It would be used for community monitoring networks, and by aerosol research laboratories as a handy, non-toxic measurement.

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**NON-PROPRIETARY DATA**